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# **The MobiCert Mobile Information Community for Organic Primary Producers: a South Australian Prototype**

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## **Abstract**

Mobile technology and m-Commerce are transforming our digital economy to a mobile one, with new markets and mobile services worldwide. Today, the importance of communication and information access in a timely and efficient manner is critical for many industries: particularly those in rural and regional areas, due to their often limited Internet access and mobile coverage. This paper presents the findings of the MobiCert project, which investigated the use of mobile technology to improve communication and information access within one of these rural industries using a Rapid Appraisal approach. As a proof-of-concept project, MobiCert focused the development of a mobile information community for organic primary producers in rural South Australia to improve their stakes in the Mobile Revolution. The extremely positive acceptance of the MobiCert solution by organic primary producers illustrated the significant potential mobile technology has to improve rural farm life in Australia.

**Keywords:** m-Commerce, mobile technology, information access, rural and regional, organic primary producers

## **Introduction**

As the Digital Economy matures, it has increasingly expanded from its original (and geographically limited) focus on computer-based technology and applications towards the more flexible opportunities provided by mobile communications and technology (m-Commerce). If the 1990s gave us the dot.com revolution, then the first decade of the 21<sup>st</sup> century might be seen as the beginning of the Mobile Revolution where the Internet, mobile communications, consumer electronics, entertainment and media combine to create new markets and services worldwide (Steinbock, 2005, Reischl and Sundt, 1999). Keen and Mackintosh (2001) refer to the Mobile

Revolution as the 'Freedom Economy'. The Mobile Revolution has a strong emphasis on innovation and changes consumers' attitudes, perceptions and communication in existing and new markets (Siau and Shen, 2003). The importance of this new mobile movement and its potential to offer new forms of business and social linkages is clearly shown by the strong growth of mobile media, entertainment and games (Steinbock, 2005, Ropers, 2001), although there are many other areas where the promise of the Mobile Revolution has not yet been fully developed. One area in which m-Commerce has enormous potential is the provision of services and applications in rural or remote locations (Giaglis et al., 2004, Barton and Post, 2006, Pescovitz, 2004). The cost and complexity of providing wired telecommunications to such environments makes mobile connections attractive to both service providers and users.

A number of research projects have already focussed on the use of m-Commerce to overcome the 'digital gap' in rural and remote areas and to improve information access and communication (Giaglis et al., 2004, Zeimpekis and Giaglis, 2006, Barton and Post, 2006, Kibati and Krairit, 1999, FAO, 2002). The importance of such research endeavours for those in rural areas has been demonstrated, for example, through an experiment in China which showed that farmers without access to telephones sold their crops 60% cheaper than those in nearby urban markets (Pescovitz, 2004, Rheingold, 2005). Pescovitz (2004) explains that m-Commerce can increase the transparency of existing markets and establish access to new markets for primary producers.

Researchers are investigating the possibilities available from information access for primary producers using m-Commerce in all corners of the globe. The *Village Phone* project by Nokia and Grameen Foundation, for example, offers low-cost mobile phone-based telecommunication services to entrepreneurs who become Village Phone Operators in rural areas of Bangladesh, Uganda, Rwanda, Cameroon and the Philippines (Anderson, 2007, Grameen Foundation, 2007). Other examples include the *Information and Communication Technology for Billions* (ICT4B) project from the University of California, Berkeley, where a mobile ICT infrastructure in rural areas is provided to rural India (Pescovitz, 2004, Tang-Quan, 2004); and the Kenya Agricultural Commodities Exchange (KACE) project which facilitates SMS technology to sell timely market information and intelligence to rural farmers equipped with mobile phones (KACE, 2007). In Cambodia, the Internet Village Motoman project uses motorcycles as Mobile Access Points via satellite uplink to provide Internet access to small rural villages. The Agricultural Information Project for Farmers of the Cancay-Huaral Valley in Peru developed community-based kiosks in the Huaral Valley, for agricultural market information and collaborations of communities in different regions (Barton and Post, 2006, Internet Village Motoman, 2007).

In this paper we present the findings of an Australian m-Commerce proof of concept project, designed to investigate the benefits of providing service access and community facilities to organic farmers. The motivation of the project was to enhance information access and provision for organic primary producers in rural areas – an important but often unnoticed part of Australian research in terms of mobile technology innovations. Additionally, we wanted to support knowledge exchange between organic primary producers, by providing a mobile community. Organic primary producers are generally willing to share their experiences, but their limited time and the wide spread of farm locations across Australia means they rarely have the chance to get together with other farmers to exchange ideas.

This paper begins with a comparatively brief introduction to the issues affecting organic farmers, before discussing the MobiCert project itself: background, structure and findings. A core element of the MobiCert project's findings was the development of a mobile information community prototype, which allows organic primary producers to collect data and access information in-field as well as communicate with one another by participating in a mobile forum. While the prototype was specifically tailored to meet the needs of organic primary producers in South Australia, it can easily be applied to other locations or industries.

## **Organic Agriculture**

In recent years the organic agricultural sector has experienced a double-digit increase in terms of: the amount of land under organic cultivation, the number of organic primary producers; and the value of organic produce (Kristiansen et al., 2006, Willer and Yussefi, 2006). Worldwide, more than 31 million hectares are under organic management with a 2004 market value of USD 27.8 billion per year which is dominated by Western Europe (USD 13.7 billion) and North America (USD 13 billion) (Yussefi, 2006).

The main drivers for this increase in demand are: the growing concern about genetically modified (GM) food; changes in agricultural policy; stronger awareness of environmental benefits and the link between health and diet; and recent reports of food safety and media scares (Chang et al., 2005, Tregear and McGregor, 1994, Watson et al., 2006).

A variety of definitions and meanings exist for the term 'organic agriculture'. The first advocate for 'organic agriculture' was Northbourne (1940) who used the term 'organic' in relation to farming with the emphasis on an integrated system as a framework for farm management. The most commonly used definition for organic agriculture is provided by the two largest organisations within this industry: the Food and Agriculture Organisation (FAO) of the United Nations and the International Federation of Organic Agriculture Movements (IFOAM), who together define organic agriculture as

*'a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasises the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system'* (FAO, 1999, IFOAM, 2005).

The organic agricultural sector is characterised by a well- defined set of standards and regulations created by national and international certification and accreditation organisations such as: IFOAM, FAO, the Australian Quarantine and Inspection Service (AQIS); or Demeter. These authorities aim to ensure that organic production maintains the quality of 'organic' labelled produce and to ensure consumer confidence in and comprehension of these qualities (Monk, 2004, Herrmann and Rundgren, 2006). Worldwide, primary producers are required to work with and be approved by a certifying organisation in order to grow and sell produce under the label 'organic' (Monk, 2004). Organic certification is a complex and time-consuming process which is currently almost completely paper-based. Organic primary producers are required to keep precise records of all their farm activities which often involve extensive paperwork. Regular inspections by authorised representatives of the relevant certification body ensure that organic primary producers conform to the given organic standards and regulations.

More 12 million hectares are under organic management in Australia and although it is a major contributor to the organic agricultural sector, Australia generated only USD 250 million in 2004, a mere fraction of the total USD 27.8 billion sourced from global sales of organic produce (Yussefi, 2006). Australia's administrative entity for organic certification is the Australian Quarantine and Inspection Service (AQIS) which provides a third-party inspection / certification model using the National Standard for Organic and Biodynamic Produce (Monk, 2004, AQIS, 2005) implemented by the 6 existing organic certification bodies accredited by AQIS. Increases in the number of farmers who are organically certified is therefore very much in Australia's interests.

Typically, a primary producer becomes organic certified over a period of three years. The process is completely paper-based and includes stages like application process, pre-certification, in-conversion and fully certified. Many organic primary producers in Australia conduct their record keeping in field – either with a piece of paper or just by memorising numbers to transfer into an electronic spreadsheet or paper-based diary at the end of the working day. It is evident that this kind of record keeping is error-prone and highly inefficient in terms of time, cost and quality.

Becoming and remaining organic certified is aggravated by Australia's unique geography, with its vast but thinly populated rural and remote areas. Additionally, communication with other organic primary producers is hindered by their busy field schedules and the huge distances between organic farms which are often hundreds of kilometres. The access and provision of information is limited in rural Australia because of slow Internet connections and poor (or no) mobile connectivity.

The existing inefficiencies in the organic certification process as well as the limitations in communication and information access in rural areas provided the motivation for us to investigate how m-Commerce technology can be applied to enhance the communication and information access for organic primary producers in rural Australia.

## **The MobiCert Project**

MobiCert was the pilot project of the Sustainable Agriculture mobile Commerce (SAmCom) project framework, developed within the Information Systems Research Laboratory (InSyL) at the University of South Australia to study the ways in which m-Commerce can improve the efficiency of sustainable agriculture in Australia. The MobiCert proof-of-concept project was a joint venture by the University of South Australia, the National Association for Sustainable Agriculture Australia (NASAA)<sup>1</sup>, m.Net Corporation<sup>2</sup>, e-Cert GmbH<sup>3</sup> and the Fraunhofer Institute<sup>4</sup> and took place between mid-2004 and end-2006.

The MobiCert project focused on how m-Commerce could contribute to improving information access/provision for organic primary producers in rural and regional areas. The project concentrated on organic primary producers in South Australia certified by NASAA, the second largest Australian organic certification body.

## **Research Design**

The project began with theoretical analysis based on an in-depth literature review of the relevant domains, which enabled us to develop a theoretical model, the Rural Area Technology Acceptance and Diffusion of Innovation Model (RuTADIM) (Lu and Swatman, 2008). RuTADIM combines several well-known IS theories, including: the Technology Acceptance Model (Davis, 1989, Venkatesh and Davis, 2000); Big Three Model of Change (Kanter et al., 1992); IS Variance Model (Furneaux, 2005); and Roger's Diffusion of Innovation Model (Rogers, 1995) – applying these concepts to a specifically rural setting. The development of the RuTADIM model enabled the identification of the relevant external factors to achieve acceptance of a mobile solution in rural and remote areas.

In addition to the research projects already discussed an introduction to this paper, many others (both academic researchers and commercial solutions providers) have been looking at providing m-Commerce solutions to primary producers in rural areas (Softscout.com, 2007, Softwareretwork.com, 2007, Captterra.com, 2007). Most of these solutions offer electronic data gathering and management functionalities, e.g. Tiger Jill (Orange Enterprises, 2006), CropWalker (Muddy Boots, 2006), FarmWorks (Farm Works Software, 2006) and FarmKeeper (Farm Keeper Software, 2006). A wide range of these software applications include both PC and mobile components, allowing them to be used in-field, yet these solutions do not take full advantage of the capabilities of mobile phones for data transfer and information access, or consider the special requirements for record-keeping which organic farmers face (Lu and Swatman, 2006). Our

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<sup>1</sup> NASAA is the second largest organic certification body in Australia

<sup>2</sup> m.Net Corporate is a mobile content provider

<sup>3</sup> E-Cert GmbH is the first company anywhere in the world to provide a software solution for data and workflow management of organic certification bodies (See Section 3.4.2)

<sup>4</sup> The Fraunhofer Institute is a renowned research institute in Germany and supported this project by the provision of their software solution BSCW.

theoretical analysis revealed an existing gap in the organic agriculture sector for information access and provision in rural areas, since there are currently no adequate software solutions, accessible through mobile devices and computers, to simultaneously enable information access, record keeping and communication. The MobiCert project offers such a solution and has the potential to bridge this gap by providing a mobile information community.

The empirical component of the MobiCert project was divided into three phases: Rapid Appraisal (RA) Data Gathering; Data Analysis & Solution Development; and Solution Validation. RA is an ethnographic research method particularly suited for data gathering in a rural setting and originated in rural development-related research. It is based on participant observations and socio-cultural anthropology (Sweetser, 1996). Crawford (1997) identifies five principles of theory for RA:

1. Optimisation of trade-offs between the costs of learning and the useful truth of information;
2. Offsetting of biases through introspection;
3. Triangulation with the help of more than one technique/source of information to cross-check answers;
4. Learning gained from and with the rural community
5. Learning that is rapid and progressive

RA helps to overcome many of the disadvantages traditional research methods have when applied in rural and remote areas, such as the lengthy production of results, expensive formal surveys and non-sampling errors that reduce levels of data reliability (Crawford, 1997, Beebe, 2002), although RA is still fairly new to IS research and has not yet been widely used. It has the potential to provide many generic benefits for IS implementation studies in remote and rural settings, as shown by Wilkins, Swatman and Castleman (2004). We chose RA as research method because it allowed us to gather fast, flexible and cost-effective data; and to analyse those data with simplicity, relevance and meaning (Dunn, 1994).

To investigate the potential acceptance and benefits of a mobile information community in a rural setting, we conducted an RA case study of NASA certified organic primary producers in SA, using a combination of document analysis, observation and interviews as data gathering techniques; and Successive Approximation (Neuman, 2004) to analyse our data.

The initial document analysis gave us an essential understanding of the data types and actual data organic primary producers must gather and keep. This was followed by observations and face-to-face interviews with 10 organic primary producers. Both RA and Successive Approximation feature a continuous analysis of the gathered data, in which results influence subsequent data gathering. Although our initial interviews were based on face-to-face interviews and in situ observations, we switched to telephone interviews part way through the data gathering process, because the data analysis was no longer producing any new information (and because visiting organic primary producers at their premises was an extremely time consuming and costly process – we often had to travel for several hours by car to get to a single organic primary producer in rural SA). 15 telephone interviews were conducted and these produced very similar results to those obtained from the face-to-face interviews. After interviewing 25 of the 67 available NASA organic primary producers in SA, therefore, we were able to identify the requirements of a mobile information community for organic primary producers; and moved on to the next stage of the research process.

## **The Mobile Information Community**

Table 1 summarises the requirements for the MobiCert information community prototype, based on the analysis and findings of our RA case study and the RuTADIM model. The participating organic primary producers underlined the importance of usability and requested a simple interface. They were also interested in the cost of such a solution which involves: device costs, potential subscription costs to a mobile service; and connectivity/data transfer costs. The participants were not concerned about security issues as they do not consider their data sensitive. This research project investigated the general acceptance of organic primary producers to use a mobile solution

for information access, so the focus of this proof-of-concept project was on not economic and security aspects, but rather on the acceptability of the solution provided.

Table 1: *MobiCert Information Community Requirements*

<b>Requirements for the MobiCert information community prototype</b>
Development of a mobile information platform accessible through any mobile device (including smart and PDA phone) via mobile or standard Web browser and (mobile) Internet connection.
The mobile component of the MobiCert prototype should support GPRS and 3G mobile Internet connection and should be designed for smart and PDA phones utilising their specific input features like in-built keyboards and touch screen.
Providing information related to organic agriculture, NASAA certification, weather forecasts, water information and organic agricultural events.
Setting up a prototypical database interface for enquiries from organic primary producers in real time regarding approved inputs. Currently these enquiries are dealt through phone by NASAA staff people and can take up to several days to provide an answer.
Providing support for mobile data-capturing in field including personalised electronic record-keeping templates.
Development of a mobile community platform with public forum, trading post and private message function.
Use of large font sizes with clear contrast to reduce the limitation of many older organic primary producers' eyesight
Support of rugged mobile devices which are dust- and moisture-proof and shock resistant suitable for the work in field.

The MobiCert information community platform was designed to be accessible through any mobile device (using a GPRS or 3G mobile Internet connection) or stationary computer – requiring us to provide both a mobile and a web version of the community. Both community versions offered the same information and functionalities, although some content was rendered differently to optimise the capabilities and limitations of the end-user devices (especially the mobile devices). Figure 1 illustrates the multilateral client/server system of the MobiCert information community.

The Linux-based server side utilises technologies like Apache HTTP Server, PHP, PEAR, phpBB, MOphpBB and MySQL to provide the functionalities of the MobiCert community. The client side of the MobiCert information community was designed to offer a high degree of flexibility, supporting a variety of devices and browser types. It supports stationary client access for desktop PCs, Mac OS and Laptops with Internet connection; and common web browsers and mobile client access for 2G mobile phones or (2G/3G) PDA/Smart phones with mobile Internet connection and common mobile web browsers. The user front-end, with its mobile service functions, was developed using HTML and PHP scripting with a MySQL database as a back-end.

The mobile version of the MobiCert community was developed and tested using an O2 XDA Mini S quad-band GPRS PDA phone, which features an inbuilt QWERTY Keyboard, touch screen, Bluetooth and WiFi connectivity. It uses Windows Mobile 5.0 as its operating system, enabling users to read and edit Word, Excel and PowerPoint files. Organic primary producers can, however, access the MobiCert community using any mobile phone with a mobile Internet connection, allowing them to access all mobile services but one – the record keeping function requires a PDA or Smart phone which supports Spreadsheet files (eg. Excel). Extending the record keeping function to a broader range of mobile phones would reduce usability, due to the limitations of existing 2G phones in terms of screen size (for data collection) and input methods (eg. standard mobile phone keypad).

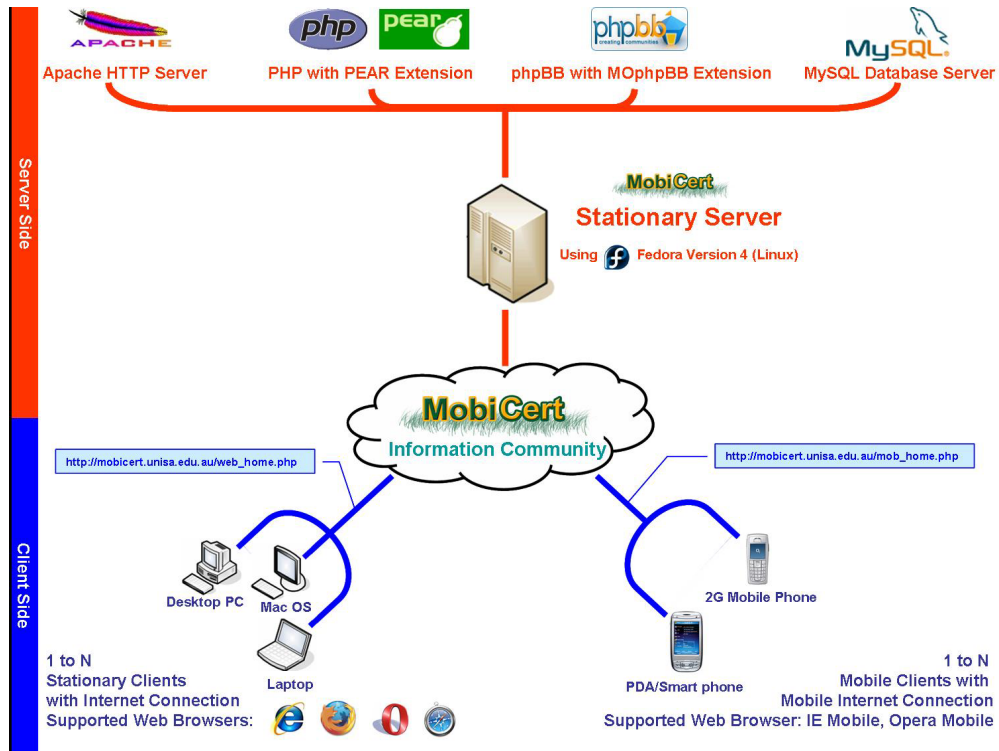


Figure 1: MobiCert Architecture

As with other virtual communities, the user is required to register online before access to the MobiCert community is granted. After entering ID and password, the user is prompted to the MobiCert Home page, which features a personal greeting, status and navigation bars, as shown in Figure 2.

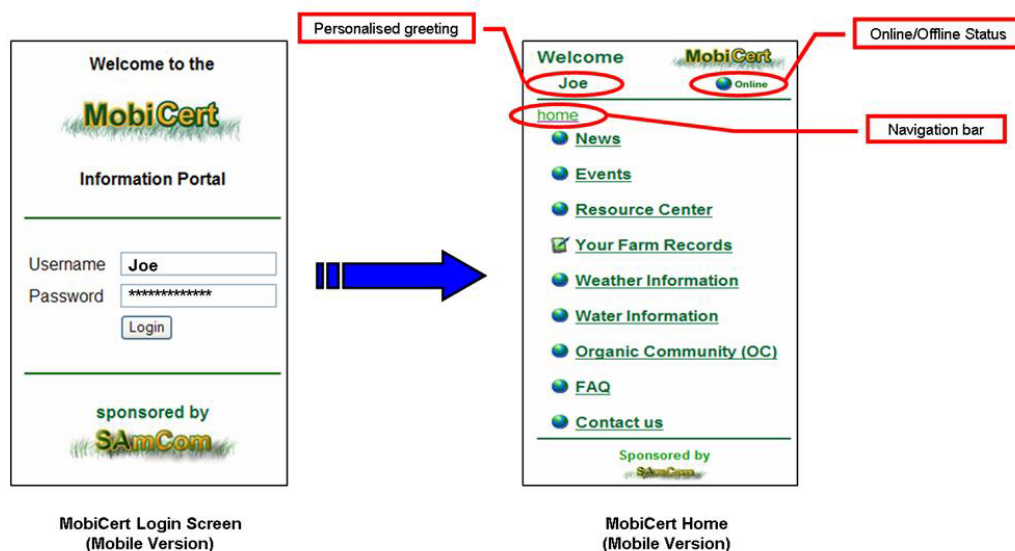


Figure 2: MobiCert Login and Home Screen



The MobiCert community offers organic certification related information such as news, events, weather and water information; a mobile record keeping function; database access for approved inputs; and an ‘organic community’ section, as shown in Figure 3. The ability to access crucial information regarding weather or water in-field is a valuable asset for organic primary producers, who spend most of their time in-field without any information resources close by. Most functionalities require an active Internet connection which is symbolised by a sphere on the MobiCert Home page. The mobile record keeping function is available both online and offline, allowing organic primary producers to gather and keep their records in-field even without existing mobile network coverage.

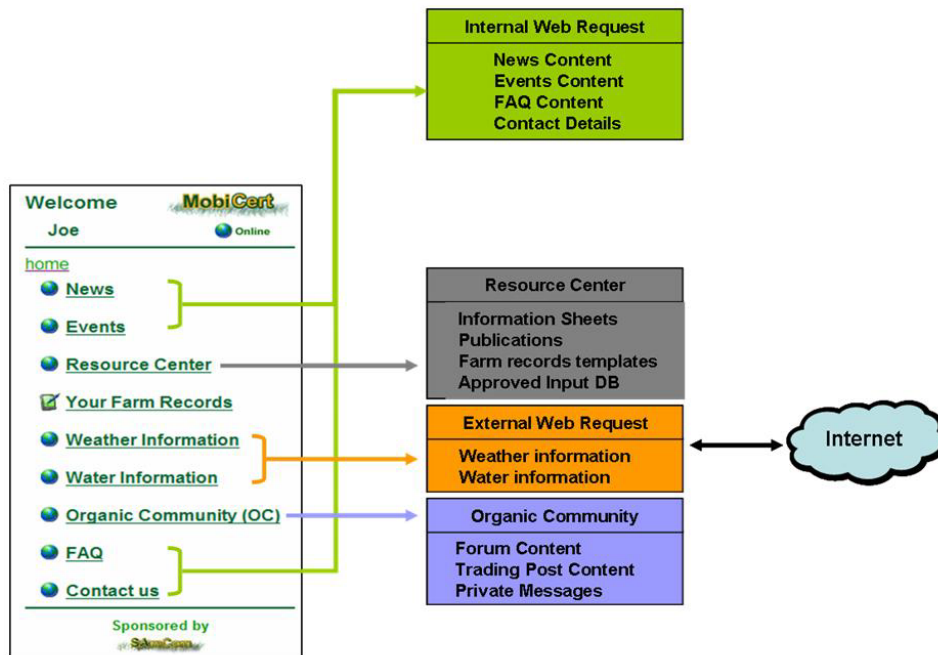


Figure 3: MobiCert Overview

Information such as News, Events, FAQ and ‘Contact us’ trigger an internal web request to the MobiCert server. Weather and water information rely on sources from the Internet and trigger an external web request when activated. Clicking on ‘Resource Center’ opens up a sub-menu containing information sheets about certification standards and regulations, publications from NASAA, Approved Input DB and farm records templates.

The RA case study revealed that organic primary producers are only allowed to use NASAA approved inputs on their farms (in most cases a primary producer phones NASAA to enquire about a certain input – this enquiry process can take up to 3-4 days, even though all approved inputs are stored on a database accessible to NASAA staff). We therefore decided to implement an Approved Input Database saved on our MobiCert server and accessible by organic primary producers, to improve and speed up the approved input enquiry process. The user can search for an approved input by product name, category, or company name.

The Resource Center allows users to generate personalised farm records templates for a variety of records including harvest, sales, input usage or input purchase in the form of an Excel Spreadsheet file. The MobiCert server populates an empty Excel spreadsheet with all necessary user information from the user profile and tables for the record keeping. The user can then decide where to save the Excel file on the PDA/Smart phone. While in-field, with or without existing mobile network coverage, the user can then open the saved template to enter records using the keypad/keyboard/stylus. Such an electronic record keeping function in-field allows organic

primary producers to save a lot of time – they no longer need to transfer their gathered data (either on paper notes or in their memory) into a paper notebook or electronic spreadsheet. At home, the organic primary producers can transfer the collected data from the mobile device to a desktop PC by using a Synchronisation Software like ActiveSync, thereby eliminating transfer errors.

A central component of the MobiCert community is the provision of a discussion forum to enhance the communication between organic farmers. Labelled ‘Organic Community’, it includes a forum to discuss topics related to organic agriculture, organic certification, news and upcoming events; and a trading post to buy and sell organic agriculture related produce and/or goods. Users can create, delete and reply to posts in the discussion forum and trading post; and send private messages to one another within the ‘Organic Community’.

The final stage of the MobiCert project, ‘Solution Development’, involved testing the mobile information community prototype, using a mixture of focus group and on-site field tests. The feedback received from organic primary producer participants was very encouraging and indicated that using a mobile phone to access and provide information while in-field had a high level of acceptability. Participants understood the need to move towards electronic certification and clearly grasped the potential uses and benefit of ICT. They embraced the idea of using a mobile phone rather than a computer, since mobile devices were very obviously more suitable for their daily work in-field. The benefits of creating a mobile information community were also very clear to participants:

- The electronic record-keeping functions could help farmers save time and maintain records of higher quality and are subject to fewer transfer errors.
- There is increased reusability and simplified backing-up of gathered data.
- The physical inspection process is made faster, by sending gathered data to the inspection body prior to an inspection.
- Accessing and exchanging information in-field using a mobile device enables primary producers to act and react faster, particularly with regards to weather changes and warnings.
- The approved input database allows organic primary producers to quickly and conveniently check the approval of any input, according to NASAA, without having to rely on a reply from NASAA staff members (who are not always immediately available)
- The organic community feature facilitates communication between organic primary producers across Australia and can strengthen their relationship with one another, helping them to exchange experiences, solve problems and share vital market information.

Our test device, the O2 XDA Mini S, fulfilled most of the requirements identified by organic primary producers during the interviews and tests. Features like the inbuilt keyboard with its large keys, and the integrated stylus and touch screen provide a convenient and simple way for data input in-field, which was welcomed by the organic farmers. The test device provided a large, bright and high-contrast screen which, in combination with the large fonts used in the MobiCert prototype, could accommodate the limited vision of some organic primary producers. While the O2XDA Mini S is not designed for outdoor use in rural areas, leaving it vulnerable to dust, moisture and physical harm (such as dropping the device), it was sufficient to identify the acceptance of organic primary producers for a mobile information community for the purposes of this research project.

All organic primary producer participants stated their willingness to use the MobiCert prototype, but also wondered about the cost of a smart or PDA phone and data access costs (including any subscription fee). Designed purely as a proof-of-concept project, our research focus was on the general acceptability of a mobile information community for organic primary producers, so that no underlying business model was developed for the MobiCert prototype. Clearly, precise details of costs to the organic primary producers for such a mobile solution is an issue to be addressed in future extensions of the project.

The MobiCert project was completed at the end of 2006 and produced two principal outcomes: the prototype MobiCert information community and the RuTADIM Model.

## Conclusion

The MobiCert project showcased the potential of m-Commerce to improve information access and provision for organic primary producers in rural and remote areas. The strong positive acceptance by the participants of our prototype MobiCert solution made it clear that such a mobile information community does, indeed, have significant benefits for both organic and (potentially) conventional primary producers. While only a proof-of-concept project, MobiCert was seen by the project participants as offering many benefits in terms of practical, day-to-day issues of organic farming, even though factors like security, costs and privacy were yet to be addressed. The findings show the potential of the paper-based organic certification process for transformation into an electronic process; and highlights the appropriateness of mobile technology as a medium information access and provision in areas where Broadband Internet is not available, such as rural South Australia.

The MobiCert project also showed us the true potential of this type of targeted mobile information community, highlighting the fact that many primary producers lead very isolated lives and are desperate for better means of communication. The ability to communicate with fellow farmers through a virtual community has the potential to improve the quality of rural life for both organic and conventional primary producers. The MobiCert solution even offers a faint hope of encouraging the younger generation to remain in or move to rural Australia – a critical issue, since many of today's younger generation are relocating to cities for a more exciting and rewarding life (ABS, 2006). An extension of the Mobicert project is underway, with a focus on all primary producers in South Australia – both rural and conventional – which includes electronic market functionalities.

Improving the ability to communicate and access information not only improves primary producers' day-to-day lives, but offers the opportunity for stronger integration into the grocery supply chain, through faster reaction times to changes to the environment and better provision of quality information. For those working in the increasingly competitive world of the grocery supply chain, such a solution has the potential to make Australia a major player in the 21<sup>st</sup> century environment.

## References

- ABS, (2006): Australian Social Trends, Australian Bureau of Statistics, <http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4102.02006?OpenDocument>.
- Anderson, T., (2007): Mobile phone lifeline for world's poor In *BBC News*, <http://news.bbc.co.uk/1/hi/business/6339671.stm>.
- AQIS, (2005): Australian Quarantine and Inspection Service, <http://www.aqis.gov.au>.
- Barton, C. and Post, P., (2006): Developing nations the new priority for the telecoms industry, <http://developingtelecoms.com/content/view/687/59/>.
- Beebe, J., (2002): The annual meetings of the Society for Applied Anthropology, "Using Rapid Assessment Process (RAP) to teach qualitative research to graduate students in professional programs such as education, nursing, and leadership studies", Atlanta, 2002.
- Capterra.com, (2007): Enterprise Software Directory, <http://www.capterra.com/agriculture-software>.
- Chang, H., Zepada, L. and Griffith, G., (2005): The Australian Organic Food Products Market: Overview, Issues and Research Needs, *Australasian Agribusiness Review*, 13.
- Crawford, I., (1997): Rapid Rural Appraisal, in "Marketing Research and Information Systems", Food and Agriculture Organisation of the United Nations, Rome.
- Davis, F., (1989): Perceived usefulness, perceived ease of use, and user acceptance of information technology, *MIS Quarterly*, 13, 3, 319-339.
- Dunn, T., (1994): Rapid Rural Appraisal: A description of the methodology, *Rural Society*, 4, 3/4, 1-11.
- FAO, (1999): Committee on Organic Agriculture, in "Organic Agriculture", (Ed, Food and Agriculture Organisation of the United Nations) Food and Agriculture Organisation of the United Nations, Rome.

- FAO, (2002): Bridging the rural digital divide, Food and Agriculture Organisation of the United Nations Rome, <http://www.fao.org/english/newsroom/news/2002/9209-en.html>.
- Farm Keeper Software, (2006): Farm Keeper, <http://www.farmkeeper.com>.
- Farm Works Software, (2006): Farm Works, <http://www.farmworks.com>.
- Furneaux, B., (2005): Diffusion of Innovation, Wade, M. and Schneberger, S., <http://www.istheory.yorku.ca/diffusionofinnovations.htm>.
- Giaglis, G., Minis, I., Tatarakis, A. and Zeimpekis, V., (2004): Minimizing logistics risk through real-time vehicle routing and mobile technologies: research to-date and future trends, *International Journal of Physical Distribution and Logistics Management - Special Issue on Risk and Uncertainty in Logistics*, 39, 4, 749-764.
- Grameen Foundation, (2007): Village Phone - Connecting Technology and Innovation, Grameen Foundation, [http://www.grameenfoundation.org/what\\_we\\_do/technology\\_programs/village\\_phone/](http://www.grameenfoundation.org/what_we_do/technology_programs/village_phone/).
- Herrmann, G. and Rundgren, G., (2006): Certification & Accreditation, in "The World of Organic Agriculture - Statistics and Emerging Trends 2006", (Eds, Willer, H. and Yussefi, M.) IFOAM, Bonn, Germany.
- IFOAM, (2005): FAQ - What is organic agriculture? (Ed, IFOAM) International Federation of Organic Agriculture Movement, IFOAM, Bonn, <http://www.ifoam.org/sub/faq.html>.
- Internet Village Motoman, (2007): Internet Village Motoman, <http://www.cambodia.net/kiri/projects/motoman.html>.
- KACE, (2007): Kenya Agricultural Commodity Exchange (KACE), <http://www.kacekenya.com/>.
- Kanter, R. M., Stein, B. and Jick, T., (1992): "The Challenge of organizational change : how companies experience it and leaders guide it", Free Press, New York.
- Keen, P. and Mackintosh, R., (2001): "The Freedom Economy: Gaining the Mcommerce Edge in the Era of the Wireless Internet", McGraw-Hill Professional.
- Kibati, M. and Krairit, D., (1999): The wireless local loop in developing regions, *Commun. ACM*, 42, 6, 60-65.
- Kristiansen, P., Taji, A. and Reganold, J., (2006): "Organic Agriculture: A Global Perspective", CSIRO, Collingwood.
- Lu, N. and Swatman, P., (2006): Proceedings of ICMB 2006 Conference, "Mobile Organic Certification (MobiCert) – A theoretical foundation for a practical project", Copenhagen, Denmark, 2006.
- Lu, N. and Swatman, P., (2008): The MobiCert mobile information community for organic primary producers: a South Australian prototype, Information Systems Laboratory, Working Paper, [http://insyl.unisa.edu.au/pages/publications/working-papers/2008\\_pub.html?menu=3#3](http://insyl.unisa.edu.au/pages/publications/working-papers/2008_pub.html?menu=3#3).
- Monk, A., (2004): The Future of Australian Organics in a Changing Marketplace, <http://www.abareonlineshop.com/product.asp?prodid=12692>.
- Muddy Boots, (2006): CropWalker, <http://www.muddyboots.com>.
- Neuman, W. L., (2004): "Basics of social research : quantitative and qualitative methods", Allyn and Bacon, Boston, Mass. ; London.
- Orange Enterprises, (2006): Tiger Jill, <http://www.tigerjill.com>.
- Pescovitz, D., (2004): Berkeley's New Peace Corps for Technology - Visionary research brings information and communication technology to the heart of developing regions, College of Engineering, U. o. C., Berkeley, <http://www.coe.berkeley.edu/forefront/fall2004/overview.html>.
- Reischl, G. and Sundt, H., (1999): "Die mobile Revolution", Wirtschaftsverlag Carl Ueberreuter.
- Rheingold, H., (2005): Farmers, Phones and Markets: Mobile Technology In Rural Development, [http://www.thefeaturearchives.com/topic/Technology/Farmers\\_\\_Phones\\_and\\_Markets\\_\\_Mobile\\_Technology\\_In\\_Rural\\_Development.html](http://www.thefeaturearchives.com/topic/Technology/Farmers__Phones_and_Markets__Mobile_Technology_In_Rural_Development.html).
- Rogers, E., (1995): "Diffusion of innovations", Free Press, New York.
- Ropers, S., (2001): New Business Models for the Mobile Revolution, *eAI Journal*, 53-57.
- Siau, K. and Shen, Z., (2003): Mobile communications and mobile services, *International Journal of Mobile Communications*, 1, 1, 3-14.
- Softscout.com, (2007): The business software encyclopedia.
- Softwarenetwork.com, (2007): Softwarenetwork.com, <http://www.Softwarenetwork.com>.
- Steinbock, D., (2005): "The Mobile Revolution: The Making Of Mobile Services Worldwide", Kogan Page.

- Sweetser, A., (1996): Relaxed (Rapid) and Participatory Appraisal - Training for Women's Empowerment Strategic Objective Team Kathmandu.
- Tang-Quan, S., (2004): Scientists help needy regions, <http://www.dailycal.org/sharticle.php?id=16188>.
- Tregear, J. and McGregor, M., (1994): The Demand for Organically-Grown Produce, *British Food Journal*, 96, 4, 21-25.
- Venkatesh, V. and Davis, F., (2000): A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies, *Management Science*, 46, 2, 186-204.
- Watson, C., Alroe, H. and Kristensen, E., (2006): Research to support the development of organic food and farming, in "Organic Agriculture - A Global Perspective", (Eds, Kirstiansen, P., Taji, A. and Reganold, J.) CSIRO Publishing, Collingwood, Australia.
- Wilkins, L., Swatman, P. and Castleman, T., (2004): Faster, Richer, Better: Rapid Appraisal Techniques for the Study of IS Implementation in Virtual Communities, *The Qualitative Report*, 9, 1, 161-175.
- Willer, H. and Yussefi, M., (2006): "The World of Organic Agriculture - Statistics and Emerging Trends 2006", IFOAM, Bonn, Germany.
- Yussefi, M., (2006): Organic Farming Worldwide 2006 - Overview & Main Statistics, in "The World of Organic Agriculture - Statistics and Emerging Trends 2006", (Eds, Willer, H. and Yussefi, M.) IFOAM, Bonn, Germany.
- Zeimpekis, V. and Giaglis, G., (2006): Urban dynamic real-time distribution services: Insights from smes., *Journal of Enterprise Information Management*, 19, 4, 367-388.